ARCTAS-CARB 2008

These slides (assembled by H. Singh) provide some basic information about the goals, capabilities, and plans for ARCTAS-California. More details about ARCTAS are available from http://cloud1.arc.nasa.gov/arctas/. The following Salient points about ARCTAS-California are noted:

- ARCTAS-CA is a CARB/NASA collaboration dedicated to California air quality and climate change objectives
- About 33 DC-8 and 8 P-3 flight hours of these instrumented platforms are dedicated to this activity. DC-8 will be based in Palmdale and P-3 at Ames.
- Field campaign will be performed during June 15-30, 2008
- CARB and NASA scientists are jointly responsible for flight planning and data analysis. Some potential flight plan ideas are presented but this process is ongoing and will be updated from time to time

Some Policy Relevant Issues Addressed by ARCTAS-CA

- Improvement of the accuracy of emissions inventories of greenhouse gas (GHG) species by providing observations for top down emissions testing and exploratory investigations of spatial and temporal distributions of combustion and non-combustion GHG emissions
- Characterization of offshore emissions of sulfur compounds from both anthropogenic and natural sources. Characterization of marine vessel emissions chemical species and mass
- Characterization of differences in aerosol chemistry above and below the marine boundary layer and changes along trajectories with flow from offshore, through the coastal zone and urban coastal plains, and into inland valleys
- Characterization of the offshore upwind boundary conditions necessary for modeling ozone and aerosol response to changes in emissions
- Observations to characterize differences in the chemical composition of air masses primarily impacted by urban versus non-urban emissions sources

ARB/NASA priorities for ARCTAS-California 2008

- Around urban areas: Provide observations for correlation of GHG species with anthropogenic tracers, especially CO.
- Offshore boundary conditions: Observe boundary conditions offshore and distance offshore needed to observe relatively uniform and stable boundary conditions for ozone precursors and aerosol precursors for regional modeling
- Source characterization: Map spatial variability of concentrations and possible emission sources for various sulfur compounds, precursors of ozone, and precursors of aerosols.
- Aerosols offshore and onshore: Characterize both emissions and chemistry, map differences in aerosol concentration and aerosol composition from offshore through coastal zone and into urban and non-urban land areas, near the coast and farther inland.
- Central Valley emissions/chemistry: Characterize concentrations in and above the boundary layer in the San Joaquin Valley contrasting between those areas less affected or more affected by urban emissions.
- Satellite observations: Tests and improvements of satellite observations and use of these products to provide context for more detailed aircraft measurements

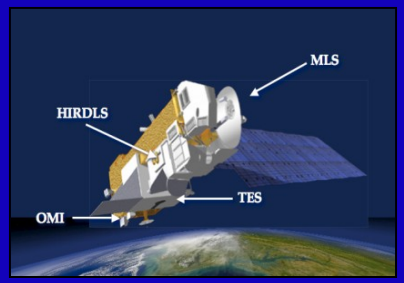
ARCTAS-CA Platforms & Observational Capabilities

NASA DC-8: Major in situ platform

Ceiling 12 km, range 7000 km, endurance 9 h
Payload: O_3, H_2O, CO, CO_2, CH_4, NO_x and HO_x chemistry, BrO, mercury, VOC/OVOC, halocarbons, SO_2. HCN/CH_3CN, actinic fluxes, aerosol composition and microphysics, remote ozone and aerosol

NASA P-3: Aerosols, radiation, CO, O_3, H_2O

Ceiling 8 km, range 4000 km, endurance 8 h
Payload: Aerosol microphysics, composition & optical depth, Radiant flux & radiance, CO, O_3, H_2O



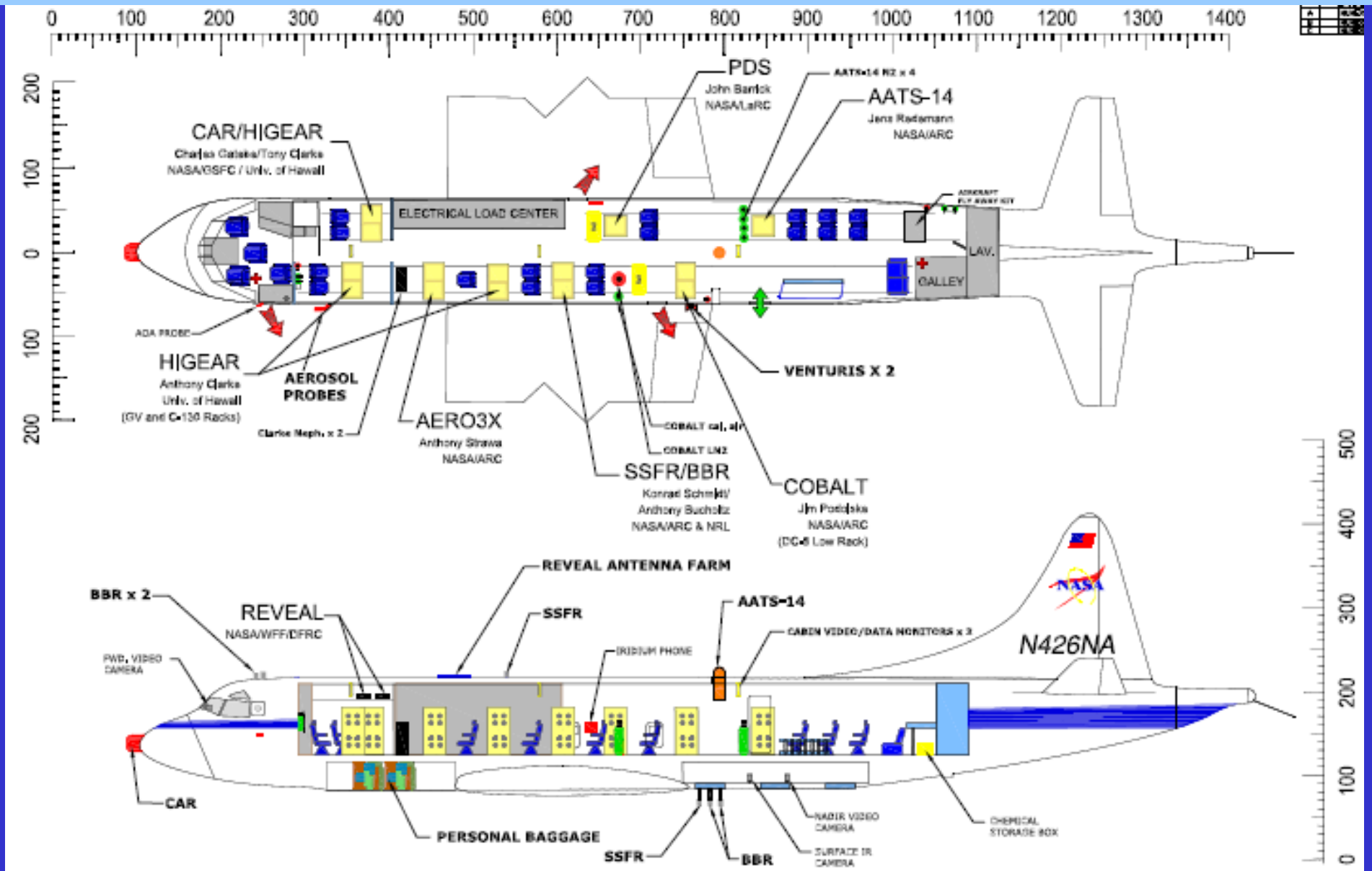
Satellite remote sensing

TES, OMI, MLS, CALIPSO, MODIS, MISR
Payload: Aerosol, CO, O_3, NO_2, HCHO, Glyoxal

DC-8 Payload


ARCTAS 2008
DLH,
DACOM
CAFS
Radiometer
AVOCET
UNH
MERC
HOx
CIMS
NCAR
CIMS
TOGA
WAS
SAGA
DAIL
CAFS
Radiometer
PTR-MS
GT-CIMS
TD-LIF
CIT-CIMS
DFGAS
ATHOS
LARGE,
AMS,
PILS,
SP2
NOxyO3

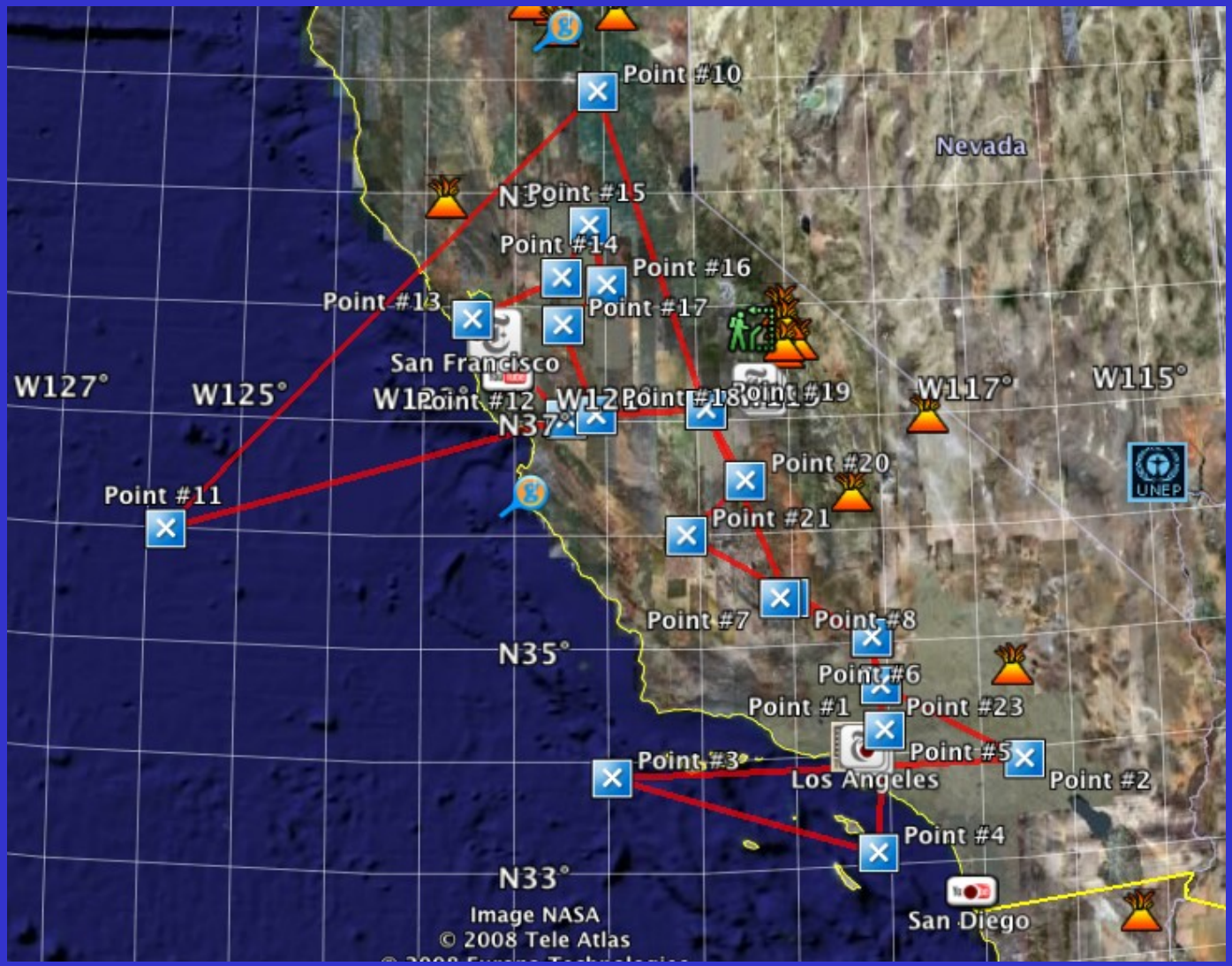
P-3 in ARCTAS: Instrument Layout



Potential collaborations during ARCTAS-CA

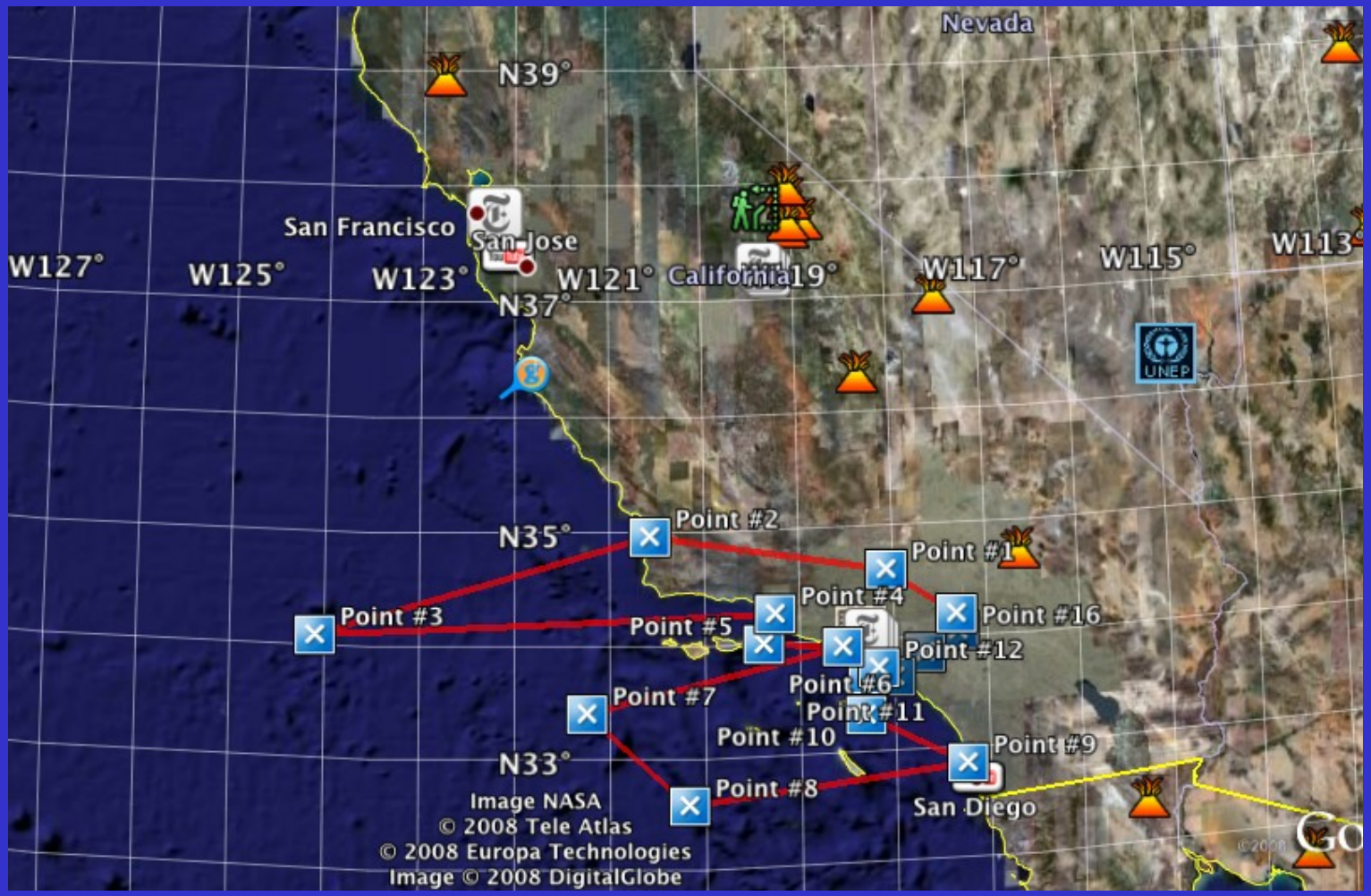
- LBL: GHG measurements and fluxes: Walnut Grove Tower and Cessna 210: Measuring CO_2, CH_4, and GHGs to 4.5 km (POC: Marc Fischer)
- LAWA: Pollutant source apportionment & air quality; Measuring gases/aerosols from a ground station near LAX(POC: Norene Hastings)
- UC- Berkeley: CH_4 wet land fluxes Sherman Island-ground station (POC: Dennis Baldochhi)
- UC- Santa Barbara: CH_4 ocean floor bubbling: Ship based observations (POC: Ira Leifer)
- UC Irvine: VOC dairy emissions in Central Valley (POC: Don Blake)
- NOAA: CO_2 and non-CO_2 GHGs: Sampling at Hanford, Point Arena, and Trinidad head (POC: Pieter Tans)

Candidate Flight Tracks: DC-8 (LA-SJV-SAC-SFBA)



Candidate Flight Tracks: DC-8 (NORCAL MBL)

Candidate Flight Tracks: DC-8 (SOCAL-MBL)



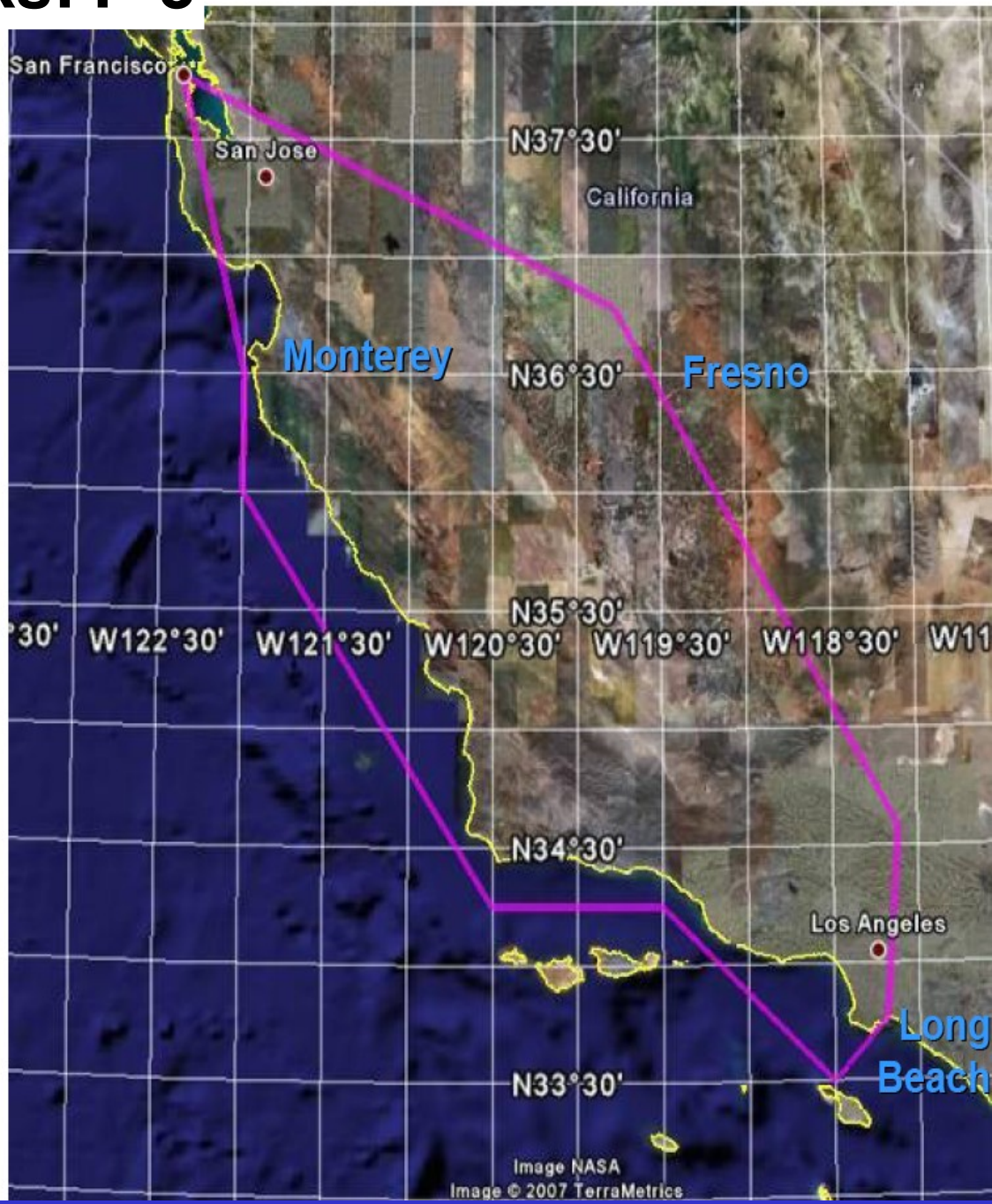
Candidate Flight Tracks: DC-8

TRK 1: Palmdale to NORCAL

TRK 2: NORCAL to Palmdale

Candidate Flight Tracks: P-3

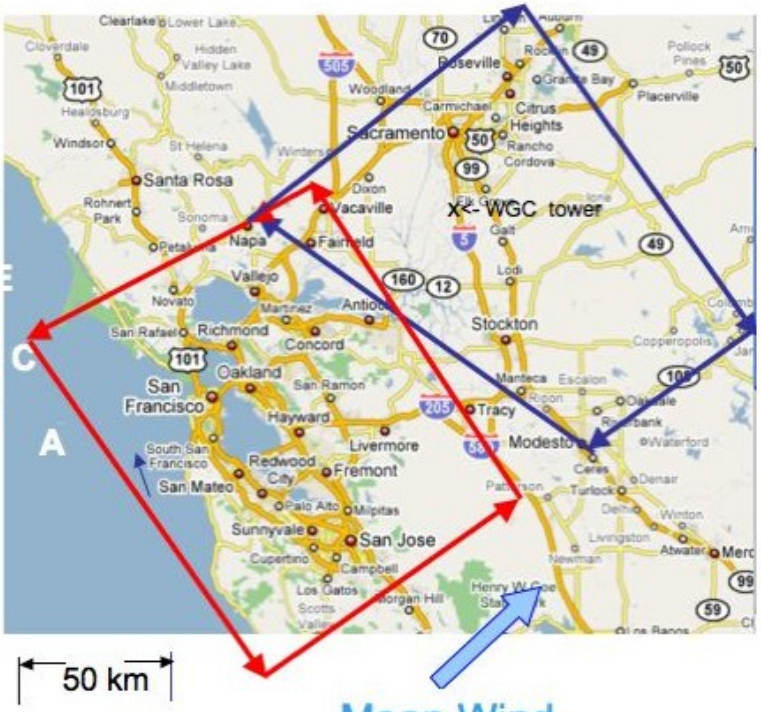
Parking garages at Fresno AERONET site. Underfly A-Train and/or Terra near San Francisco
and/or Monterey (possible Marine stratus-aerosol study).
Sample/study Long Beach harbor ship & marine emissions
Possible coordination with DC-8.



Candidate Flight Tracks Cessna 210

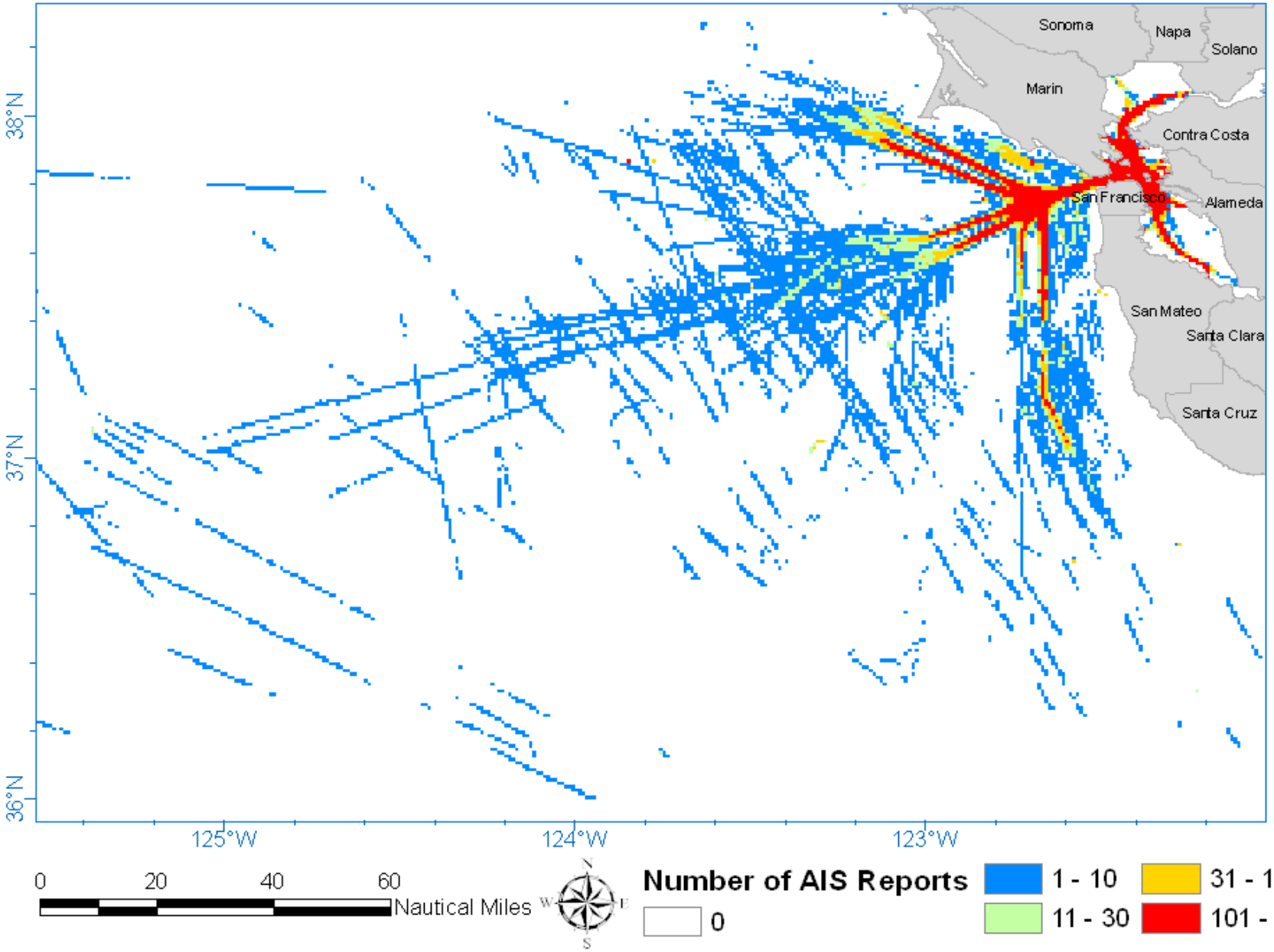
Airmass Following Sawtooth-Curtains

- Example of flights from Napa, CA
- Note Walnut Grove (WGC) tower location "x"
- Plan 1 (red ~ 450 km ~ 4-5 hr) captures oceanic upwind boundary condition and outflow from Bay Area to gauge emissions
- Plan 2 (blue ~ 450 km ~ 4-5 hr) captures Bay area outflow as upwind boundary condition, and outflow from Sacramento Valley to gauge emissions



- Payload:
  - CO2
  - CH4
  - Flask sampling
- Ceiling: 4.5 km
- Duration: 5 h

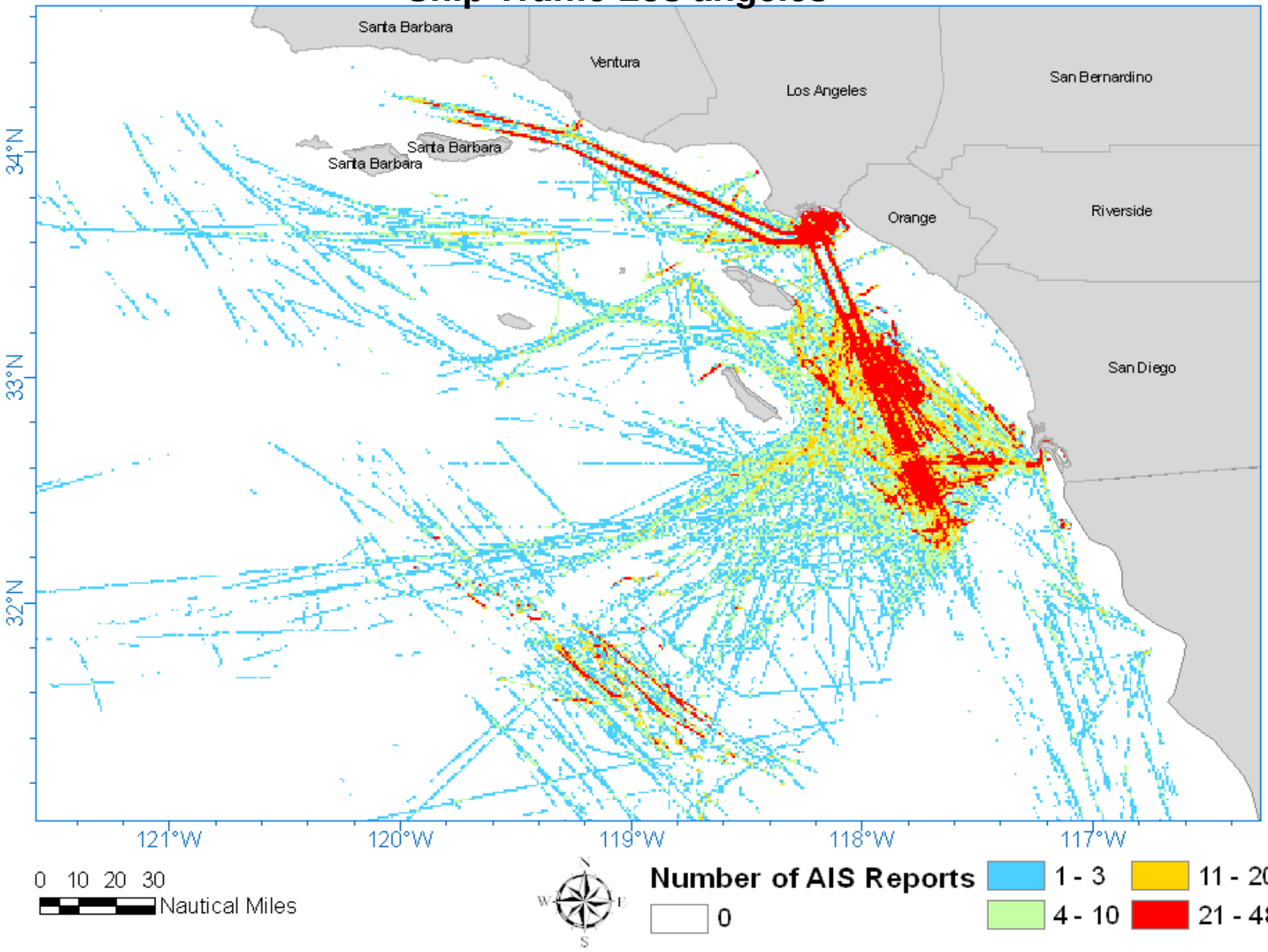
Ship Traffic- Golden Gate



Number of AIS reports within 0.01 degree grid cell
based on boatingsf.com AIS data Dec. 2006 through Aug. 2007

February 5, 2008

Ship Traffic Los angeles



Number of AIS Reports within 0.01 degree grid cell
based on SiiTech AIS data Aug. 2007 through Oct. 2007

February 4, 2008